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1817

BULLETIN

OF THE

Agricultural & Mechanical College

OF TEXAS,

(Technical Branch of the University,)

COLLEGE STATION, BRAZOS COUNTY, TEXAS.

A REPORT

OF

EXPERIMENTS AND OBSERVATIONS

CONDUCTED AT THE COLLEGE.

(Issued from Time to Time as Results may Require.)

—No. 3.—

NOTES AND EXPERIMENTS,

June 1st, 1885.

HOUSTON, TEXAS:
J. J. PASTORIZA, PRINTER AND STATIONER, 89-91 CONGRESS STREET.
1885.

PREFACE.

OWING to changes made by the Board of Directors at their last meeting, several experiments which had been planned, with reference to calves and milk-cows, do not appear in this number.

Our main object in experimental work this year has been the starting of a series of experiments with fertilizers on corn—a synopsis of which appears on a subsequent page. The experiments with manures mentioned in BULLETIN No. 2, are not given in full, because of inaccuracy in carrying out results; we can only mention the fact, that wherever the manure was applied a wonderful influence was shown on vegetation.

Our experiments with pigs have an actual bearing on practical feeding, and the question of too much salt as a hindrance to fat production, should have much more extensive investigation.

We would call especial attention to the analytical work of Walter Wipprecht, a post graduate student in the Agricultural Department.

The fertilizers analyzed are in practical test now, as will appear from "Field Notes on Experiments," in this number.

Co-operation in all experiments connected with agricultural industry is heartily invited; and we desire to urge upon the farmers of Texas the vast good that may result from a system of co-operation in this direction. Let all who are willing to try experiments address us on the subject, that we may be able to formulate a plan of investigation to secure uniformity in results.

Respectfully submitted,

GEO. W. CURTIS,
Prof. Agr. and Hort.

IN the following experiments the pigs were divided into two lots, one of which, for convenience, we designate "pen No. 1," the other, "pen No. 2."

In order that individual characteristics might be eliminated as far as possible from results, the different pens were fed in certain order for one week, at the end of which time, feed was *exactly reversed*, "pen No. 1" receiving the feed which "pen No. 2" had received in the first half of the experiment.

In all the experiments, the reader must bear in mind that a *rapid* gain was not only not desirable, but that such a condition would have vitiated results by bringing in more or less of individual peculiarity in regard to assimilation.

EXPERIMENT No. 8,

To Test the Value of House Slops in the Production of Pork.

Length of Experiment, Fourteen Days.

Feed per day and head—One-third pound bran, one-third pound cotton-seed meal, two-third pounds shelled corn, one gallon house slops. Bran and cotton-seed meal were mixed with slop and fed twice daily.

FIRST HALF OF EXPERIMENT		Weight in lbs.	Feb. 25	March 4	Gain	Loss	Net Total
	PEN No. 1......	Pig No. 1......	78.	86.	8.	....	....
		" 2......	76.5	84.25	7.75	....	....
		" 3......	77.5	81.5	4.	....	....
		Total......	232.	251.75	19.75	....	19.75
		Weight in lbs.	March 4	March 11	Gain	Loss	Net Total
	PEN No. 2....	Pig No. 1......	79.5	85.5	6.	....	....
		" 2......	111.5	122.25	10.75	....	....
		" 3......	59.	63.	4.	....	....
		Total......	250.	270.75	20.75	....	20.75

Feed per day and head—same as above, except the one gallon of house slops was withdrawn.

SECOND HALF OF EXPERIMENT		Weight in lbs.	Feb. 25	March 4	Gain	Loss	Net Total
	PEN No. 2......	Pig No. 1......	79.5	79.5	....	....	....
		" 2......	110.5	111.5	1.	....	....
		" 3......	59.25	59.	....	0.25	....
		Total......	249.25	250.	1.	0.25	0.75
		Weight in lbs.	March 4	March 11	Gain	Loss	Net Total
	PEN No. 1......	Pig No. 1......	86.	85.25	....	0.75	....
		" 2......	84.25	85.75	1.5	....	....
		" 3......	81.5	81.5	....	....	....
		Total......	251.75	252.5	1.5	0.75	0.75

Fourteen days feeding with slops, gain, 40.5 pounds.
" " " " without " " 1.5 "

Making a net gain due to house slops alone of 39 pounds.

A fact which shows the full value of utilizing the waste portions of food from the kitchen; it also illustrates a frequent source of loss, where hogs are allowed to range at will and receive no benefit from what, in such cases, is thrown away.

To secure accurate results it was necessary to give a ration which should cause neither gain nor loss, and then add a selected amount of food, the value of which we desired to test. By examining the table we notice that "pen No. 2" *without* house slops gained a net total of only $\frac{3}{4}$ lb., and that "pen No. 1," under like conditions, gained exactly the same amount; hence, we conclude that a daily ration composed of $\frac{1}{3}$ lb. each of bran and cotton seed meal, and $\frac{2}{3}$ lb. of shelled corn with water, given freely, is approximately, a *maintenance fodder* for pigs 4 to 6 months old. Fourteen gallons of house slops, then produced 39 lbs. of pork; by a simple calculation 36 gallons would produce 100 lbs. of pork, worth at least $2.00; or one gallon of *good* kitchen slop, has, for growing pigs, an actual cash value of $5\frac{5}{9}$ cents.

EXPERIMENT No. 9.

To Test the Comparative Values of Corn Meal and Cotton Seed Meal in Pig Feeding.

Length of Experiment, Fourteen Days.

Feed per day and head—One-third pound bran, one-half pound corn meal, one gallon house slops, two pounds shelled corn. Fed in same order as in Experiment 8.

FIRST HALF OF EXPERIMENT

	Weight in lbs.	March 26	April 2	Gain	Loss	Net Total
PEN No. 1......	Pig No. 1......	94.75	100.	5.25		
	" 2......	95.	100.	5.		
	" 3......	93.25	97.	3.75		
	Total......	283.	297.	14.		14.

	Weight in lbs.	April 2	April 9	Gain	Loss	Net Total
PEN No. 2......	Pig No. 1......	100.5	108.	7.5		
	" 2......	138.5	150.5	12.		
	" 3......	71.5	80.	8.5		
	Total......	310.5	338.5	28.		28.

Feed per day and head—Same as above, except *corn meal* was changed for an equal amount of *cotton-seed meal.*

SECOND HALF OF EXPERIMENT

	Weight in lbs.	March 26	April 2	Gain	Loss	Net Total
PEN No. 2......	Pig No. 1......	97.25	100.5	3.25		
	" 2......	133.5	138.5	5.		
	" 3......	71.25	71.5	0.25		
	Total......	302.	310.5	8.5		8.5

	Weight in lbs.	April 2	April 9	Gain	Loss	Net Total
PEN No. 1......	Pig No. 1......	100.	113.75	13.75		
	" 2......	100.	113.5	13.5		
	" 3......	97.	97.			
	Total......	297.	324.25	27.25		27.25

Fourteen days feeding with corn meal, gain, 42 pounds.
" " " " cotton-seed meal, " 35.75 "

Making a net gain in favor of corn meal of 6.25.

Assuming the above result as conclusive, and assigning to cotton seed meal a value of *one*, we find, by proportion, the value of corn-meal to be 1 3-17; or, to express it more clearly, cornmeal—*aside from the cost of either*—has 1 3-17 times the value of cotton seed meal in feeding pigs.

The pigs used in experiments Nos. 8 and 9 were of following breeds:

Pen No. 1. Pig No. 1, thoroughbred Essex sow.
" " 2, cross-bred barrow, Essex and Jersey red.
" " 3, low-grade Poland China barrow.

Pen No. 2. Pig No. 1, thoroughbred Essex sow.
" " 2, cross-bred sow, Essex and Poland China.
" " 3, low-grade Poland China sow.

An examination of the tables will determine any influence of breed which may have been potent in causing gain or loss.

For the purpose of comparision we present herewith a table, showing the average composition of the two fodders used; taken from the tables of J. Kuhn, as compiled by Henry P. Armsby, Chemist to Connecticut Agricultural Experiment Station:

COMPOSITION Per cent.	WATER	PROTEIN	FAT	NITROGEN FREE EXT.	CRUDE FIBRE	ASH	TOTAL
Corn meal........	18.4	8	3	68.	1.4	1.2	100
Cotton seed meal	7	42.9	17.3	18.6	7.4	6.8	100

From these analyses it would seem that cotton seed meal would be the better of the two for feeding purposes; and, while the result of experiment 9 leads us to a reverse decision, yet we would urge further trial until disproved or established beyond a doubt.

EXPERIMENT No. 10.

To Test the Influence of Salt as a Hindrance to fat production.

Length of Experiment, Fourteen Days.

Feed per day and head—One pound bran, one-half pound chops, two pounds shelled corn; water given freely and small amount of *salt* in each feed.

		Weight in lbs.	April 22	April 29	Gain	Loss	Net Total
FIRST HALF OF EXPERIMENT	PEN No. 1......	Pig No. 1......	40.	43.75	3.75	....	....
		" 2.....	50.	49.5	....	0.5	....
		" 3......	74.75	78.25	3.5	....	....
		Total......	164.75	171.5	7.25	0.5	6.75
		Weight in lbs.	April 29	May 6	Gain	Loss	Net Total
	PEN No. 2......	Pig No. 1......	101.5	107.25	5.75	....	....
		" 2......	73.75	75.5	1.75	....	....
		" 3......	50.	50.	....	....	....
		Total......	225.25	232.75	7.5	....	7.5

Feed per day and head—Same as above, *without the salt.*

		Weight in lbs.	April 22	April 29	Gain	Loss	Net Total
SECOND HALF EXPERIMENT	PEN No. 2......	Pig No. 1......	91.75	101.5	9.75	....	....
		" 2......	66.5	73.75	7.25	....	....
		" 8......	56.75	50.	....	6.75	....
		Total......	215.	225.25	17.	6.75	10.25
		Weight in lbs.	April 29	May 6	Gain	Loss	Net Total
	PEN. No. 1......	Pig No. 1......	43.75	46.5	2.75	....	....
		" 2......	49.5	50.25	75	....	....
		" 3......	78.25	83.	4.75	....	....
		Total......	171.5	179.75	8.25	....	8.25

Fourteen days feeding *without* salt, gain, 18.5 pounds.
" " " " *with* " " 14.25 "

Making a net *loss* due to feeding salt of 4.25.

The pigs used in this experiment were considerably mixed as to breed, and their natural proclivities proved so hard to overcome as to somewhat weaken the result:

Pen No. 1.
Pig No. 1, scrub sow.
" " 2, " "
" " 3, cross-bred barrow, Essex and Jersey red.

Pen No. 2.
Pig No. 1, cross-bred sow, Essex and Jersey red.
" " 2, " " " " " "
" " 3, scrub barrow.

It will be noticed that "pig No. 3" in "pen No. 2" lost 6¾ lbs., when fed *no* salt; this resulted from his almost rigid abstinence from diet of any kind for the first four or five days. It may be confidently asserted that, but for this, the influence of salt in the fodder would have been much more marked.

WEIGHT OF CALVES,

Showing Growth and Gain.

Weight in lbs., 1885.	DUTCH FRESIANS, RECORDED IN VOLUME IV, D. F. H. B., OF AMERICA.				GALLOWAYS, RECORDED IN VOLUME II, AMERICAN G. H. B.		
	Raab (Bull), No. 486, D. F. H. B., dropped Feb. 29, 1884.	Metje, 2nd, No. 1653, D. F. H. B., dropped March 20, 1884.	Jessica, 2nd, No. 1654, D. F. H. B., dropped April 11, 1884.	Yentje, 2nd, No. 1446. D. H. F. B., dropped May 1, 1884.	Admiral Good (Bull), No. 1184, G. H. B., dropped March 7, '84.	Acume, No. 1188, G. H. B., dropped April 3, 1884.	Admiration, No. 1186, G H B., dropped March 15, 1884.
January 3	790	707.5	650	490	591	471	512.5
" 10	795	711	652.5	486	592.5	471	522.5
" 17	795	712.5	655	496	605	475	511
" 24	830	725	657.5	520	638	490	513
" 31	807.5	722.5	642.5	522.5	620	487.5	512.5
Gain for January	17.5	15	—7.5	32.5	29	16.5	....
February 7	806	727.5	665	526	641	484	522.5
" 14	830	740	680	520	652	496	530
" 21	832.5	755	692	498	671	470	542.5
" 28	839	780	710	515	687.5	472.5	546
Gain for February	31.5	57.5	67.5	—7.5	67.5	—15.	33.5
March 7	830	751	702.5	508	693	472.5	542
" 14	845	795	737.5	545	707	486	550
" 21	872.5	807.5	732	570	712	495	552.5
" 28	892.5	792.5	720	572	731	502	550
Gain for March	53.5	12.5	10	57	43.5	29.5	4
April 4	908	830	762	617	737.5	527.5	575
" 11	917	832	762	621	749	535	575
" 18	915	839	767	645	740	538	580
" 25	975	873	805	668	767	561	594
Gain for April	82.5	80.5	85.	96	36	59	44
May 2	977.5	863	802	677.5	777.5	577	608
" 9	1007.5	892	827	695	809	586	615
Gain two weeks in May	32.5	19	22	27	42	25	21
Total gain 4½ months	217.5	184.5	177	205	218	115	102.5

These calves were imported from the North during the latter part of November last—the Dutch Fresians from Iowa, the Gallaways from Kansas City, Mo.—and are *excellent* types of the breeds they represent.

A brief description of the two breeds may not be out of place here: The Galloway is a Scotch breed—*without* horns—color, black (in winter tinged with brown), hair, long, and more or less curled or shaggy; legs, short; body, long; neck, thick; outline typical of beef. They are excellent feeders and produce an excellent quality of beef.

The Dutch Fresians are, as the name indicates, from Holland, province of Friesland. They stand unrivalled in quantity or yield of milk, which, while not so rich in butter as that of the Jersey and Alderney, is still of *very good* quality. The globules, as seen under the microscope, are of a medium size, and *remarkably even*, adapting the milk admirably for cheese-making. The smallness of the globules necessitates a longer period for cream rising than required with milk of other breeds.

The DUTCH FRESIAN and the HOLSTEIN associations have always been kept entirely distinct; lately, however, the two associations have taken steps to effect a union under the name,

"HOLSTEIN-FRESIAN ASSOCIATION OF AMERICA."

It is to be hoped that the efforts put forth to this end may reach an early consummation, as it would undoubtedly be for the best interests of all breeders of Holland or Dutch cattle.

The cattle are *pure* black and white in color—large sized—excellent feeders, and of the *typical milk outline*; frequently giving from 12,000 to 16,000 lbs. per year—a record of 9000 lbs. being required to admit a cow to entry in the main or advanced register.

GRASSES.

Thus far, we have found but few grasses that even promise well, the great trouble being the long drouth, which kills everything not extremely tenacious of life. From the peculiar conditions of our climate, we must soon see, that any chance to secure a forage plant which will thrive, must be limited to two classes of vegetation, viz:

1. Plants which send out strong vigorous roots, running far down below the influence of the scorching summer heat, or subterranean stems (*rootstocks*). Perennial plants of the most hardy and vigorous nature.

2. Plants which spring up in fall from the seed, grow most rapidly in early spring, and ripen seed perfectly before the drouth comes on. Seed of any kind remain perfectly safe and dormant during the long dry period, and spring up readily after the fall and winter rains.

Under the first class—perennials—nothing has given such marked satisfaction as Texas Blue Grass (*Poa Arachnifera*). Last summer (1884) was the most severe drouth known for years in this locality, yet the roots of the Texas Blue Grass seemed to derive renewed vigor from the summer's inactivity, pushing out a wonderfully fine growth for winter pasturage, and ripening an abundant seed crop about May 1. It seems to be rapidly spreading over a considerable portion of Central and Northern Texas, especially that portion between the Brazos and Trinity rivers. Specimens have been found in several of the lower counties, and in more northern counties—notably, Ellis and Johnson—it has already obtained a considerable foothold. As a hay crop, while not equalling Johnson Grass in quantity, it has certainly the recommendation of very fine quality; and as winter pasture it is unexcelled.

Johnson Grass (*Sorghum halapense*) makes more hay to the acre than any other grass grown in Texas; in quality it is rather coarse, and seems to be somewhat illflavored. As a pasture grass we do not consider it a success unless sown on poor, barren lands where other grasses would fail; it is so extremely tenacious of life that it will thrive where many other plants would die. The illflavor mentioned above belongs more especially to the growing crop, as when cut and properly cured it makes a very fair hay.

ALFALFA (*Medicago Sativa*), though not a grass, ranks under the class of hardy perennials.

We find, that on rich ground it will do remarkably well, making a *good* stand in one year; but on poor land the roots will not penetrate deep enough to withstand the drouth; some of the plants will live, but so scattered as to make anything like a reasonable crop an impossibility. If Alfalfa is to be raised for profit—as either pasture or hay crop—our ordinary lands must be well prepared by manuring; it seems to demand a soil containing a considerable amount of humus—in the low deposit lands along the rivers it grows with great luxuriance, a fact we may make use of by stating that well-rotted barn-yard manure will supply not only the fertility, but the humus so much needed in our stiff upland clays.

BERMUDA GRASS (*Cynodon dactylon*) is too well known as a summer pasture and lawn grass in Texas to need further mention here.

Under the second class — annuals — RESCUE GRASS (*Bromus unioloides*) is, perhaps, taking the lead. Its seed lies dormant all summer, springing up quickly and vigorously after fall and winter rains. Stock of all kinds are exceedingly partial to it, and coming—as it does—before the native wild grasses appear, it is recognized as most valuable for a late winter pasture. As a hay crop we see but one reason why it would not do well: being an annual, there is danger of weakening or destroying the stand by removing too much of the seed.

CANARY GRASS (*Phalaris Americana*) is another one of this class of grasses which will, sooner or later, be recognized as a valuable late winter annual. Its culms are tender, sweet and juicy, leafy almost to the summit, and eaten with great relish by all kinds of stock.

In this county (Brazos) it is multiplying rapidly, and bids fair to come into general favor.

The Millets all do well here, but the cost and trouble necessitated by resowing every spring diminish their value quite materially.

Of the following grasses tested the past year (1884) we have to say—they are *failures* for this portion of our State:

Timothy (*Phleum pratense*), Kentucky Blue Grass (*Poa pratensis*,) Orchard Grass (*Dactylis glomerata*), Sheeps Fescue (*Festuca ovina*), Red Top (*Agrostis vulgaris*) and Perennial Rye Grass (*Lolium perenne*).

Orchard Grass and Perennial Rye Grass we shall try again, hoping to have a better report on next trial.

Japan Clover (*Lespedeza striata*) is obtaining considerable favor in various parts of the State, especially Eastern and Northeastern Texas, but we are not prepared to make any statement—pro or con —without further trial.

ANALYSES OF FETILIZERS, BY WALTER WIPPRECHT,

Post Graduate Student.

	Per ct. total Ammonia	Per ct. free Ammonia	Per ct. Phosphoric acid	Per ct. Potash
Columbus Fertilizer, manufactured at Columbus, Tex	3.98	1.21	14.5	2.97
Texas Phosphate, manufactured at Galveston, Tex.......................	3.528	0.98	6.505	
Baugh's Bone Meal, manufactured at Galveston, Tex..................	3.92	......	19.96	
Ammoniated Phosphate, manufacfactured at San Antonio, Tex....	1.568	0.196	8.78	
Cotton Seed Meal, from Schumaker's Oil Works, Navasota, Tex	9.408			

A brief synopsis of the methods used in the determinations may be of interest.

TO DETERMINE TOTAL AMMONIA

a known amount of substance burned in combustion tube, with soda lime—gases passed through known volume of sulphuric acid, requiring known amount of sodic hydrate to saturate. After combustion, less quantity of sodic hydrate was required to saturate the sulphuric acid. This difference, then, represented the ammonia which was taken up by the sulphuric acid resulting from combustion of the known quantity of the substance; from the data thus obtained the percentage of ammonia is easily determined.

TO DETERMINE FREE AMMONIA,

known amount of substance placed in a dish and strong caustic potash solution poured over it, allowed to stand for five days in presence of sulphuric acid—requiring known amount of soda hydrate to saturate; at end of five days, required less amount to saturate—difference representing amount of *free ammonia* given off by substance and absorbed by sulphuric acid, from which percentage is obtained.

TO DETERMINE PHOSPHORIC ACID,

known amount of substance, fused with known weight of fusion mixture, and then dissolved in known quantity nitric acid of known strength, silica was removed by precipitating with ammonic molybdate—precipitate redissolved in warm ammonium hydrate, and the phosphoric acid precipitated by magnesia mixture; this, after being dried by ignition, and weighed, gives all data necessary for determining percentage of phosphoric acid.

TO DETERMINE POTASH—IN FORM OF THE OXIDE (K_2O),

known amount of substance ignited with nitrate of ammonia—dissolved in hydrochloric acid, silica removed—sulphuric oxide removed by chloride of barium, and filtrate reduced by evaporation. Added ammonic carbonate and ammonic oxalate—filtered—washed carefully, evaporated to dryness and ignited to expel ammonia salts. Ignited residue was dissolved in water containing few drops hydrochloric acid — filtrate evaporated to dryness and weighed. Residue again dissolved, perchloride of platinum added in excess and evaporated nearly to dryness over water at 75 degrees, centigrade; platinic chloride dissolved out by alcohol and ether—filtered—contents of filter dried and weighed, giving data for percentage determination.

These analyses are given here because of their intimate connection with the experiment on corn. Professor Dinwiddie will publish in full, results of investigations made in the chemical laboratory, as a separate bulletin, which we doubt not will prove of interest to the farmer.

FIELD NOTES ON EXPERIMENTS.

Each plat one half acre in extent.

Plat No. 1—Corn on *shallow plowing* even stand, not necessitating replanting; hence, shows up well as to size. Shallow plowing keeps from planting too deeply, hence prevents rotting in bad weather.

Plat No 2.—Corn on *deep plowing* uneven stand; had to be planted in in places. Corn, healthy color, but looks badly on account of replanting.

Plat No. 3—Corn with *cow manure* also uneven. First planting strong, dark-green, large; second, or replanting, following rapidly.

Plat No. 4—Corn with *Texas phosphate*, good stand; *very* large; bright dark-green—ahead of all at this date, May 15.

Plat No. 5—Corn with *Baugh's bone meal*—planted later—fair stand, healthy color and good size. Bone meal shows up better the second year.

Plat No. 6—Corn with *ammoniated phosphate*, planted same time as No. 5, fair stand; bright-dark color; vigorous growth, larger than No. 5, and pushing more rapidly.

Plat No. 7—Corn with *cotton seed meal*, planted same time as Nos. 5 and 6, rather smaller, and not so good color as either.

Plats Nos. 8 to 28, inclusive—Small plats testing varying quantities of same fertilizers used on larger plats. The differences being so slight that we can hardly give any field notes which will be of value until later on.

As to mode of application and quantity applied, accurate data will be given when results are published in full.